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Case report

# Movement artefact mimicking type 2 odontoid fracture on CT reconstructions

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## 1. Introduction

Computed tomography (CT) scan is the imaging modality of choice for many trauma patients. It is especially valuable in patients with head and spine trauma as well as thoracoabdominal injuries. With modern CT scanners increasing use is made of the ability of software to reconstruct images in planes different to the plane of acquisition. We report on a case of movement artefact suggesting a typical type II fracture of C2 on reconstructed images.

## 2. Case report

A 39-year-old male was admitted to the emergency department having been a pedestrian struck by a car. He was complaining of severe right knee and neck pain since the injury and had been fully immobilised at the scene. Physical examination revealed a haemarthrosis of the right knee and midline bony tenderness of the upper cervical spine. Plain X-rays were performed as part of the initial evaluation with normal appearances from C1 to C6. Plain X-rays of the knee confirmed a tibial plateau fracture. A helical CT scan (Toshiba Aquilion) using bone algorithm (120 kV, 250 mA) and 2 mm slice thickness was performed to evaluate fully the cervical spine. It was reconstructed in coronal and sagittal planes (slice thickness 1.58 mm). This was reported as showing a displaced type 2 fracture of the odontoid peg. An MRI scan was requested.

The CT scan was sent to the regional neurosurgery unit for review. On review of the sagittal reconstructions an apparent fracture of the base of the odontoid peg of C2 was evident (Fig. 1). Further review of this image however showed a less obvious movement artefact at the level of the apparent fracture throughout the soft tissues of the oropharynx suggestive of movement artefact. Review of the axial images from which the reformatted images were obtained showed no loss of cortical discontinuity around the base of the odontoid peg, but a clear movement artefact "ghost" in this region (Fig. 2). The MRI scan had been performed at this time which was normal. Accordingly the immobilisation was removed and treatment of the leg injuries proceeded.

## 3. Discussion

CT scanning has become a staple part of evaluation of the patient with confirmed or suspected bony injury of the cervical spine.[5] The increased sensitivity allows confirmation or dismissal of suspicious – including artefactual – findings on plain X-rays.[1]

Artefactual findings on CT scan are well reported which can make these scans difficult or impossible to interpret. Movement artefacts on axial CT scans are within this group and are usually easily identified. The recognition of the artefact is vital to allow the opportunity to repeat the imaging as appropriate and to prevent overtreatment. With the advent of multislice CT scanners there has been increasing use of reformatting software to view images in different planes and this has been shown to improve diagnostic accuracy.[3,6,7] This technique will however translate movement between axial acquisition scans into apparent discontinuity on reformatted sequences. This artefact has recently been seen to mimic dislocation in the cervical spine .[4] When bony structures are viewed, this will give a typical appearance of cortical discontinuity suggestive of a fracture. This problem will especially arise when the apparent fracture is of a familiar type or pattern as in this instance.[2]

While thorough review of the imaging makes the artefact obvious to the experienced clinician, such investigations are

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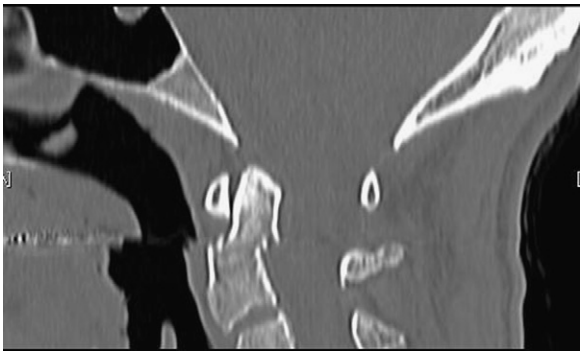

**Fig. 1.** Sagittal reformat CT scan (bone windows) with apparent fracture through the base of the odontoid peg. Closer inspection reveals a step deformity in the soft tissues of the oropharynx suggesting artefact.


**Fig. 2.** Axial source images of the same CT scan through the base of the odontoid peg. There is "ghosting" of the cortex of C2 diagnostic of movement during the scan acquisition.

increasingly performed "as required" including at night, when their interpretation may be left to junior or inexperienced staff.

This case illustrates the importance of reviewing the whole of an X-ray or similar image specifically to look for associated abnormalities: in this case the apparent step deformity of the soft tissues in the oropharynx are an indication of an artefactual scan. The importance of reviewing previous examinations, even if they are considered inferior, should also be remembered: here the plain X-ray showed no suggestion of abnormality at C1–C2. It also illustrates the need in interpreting scans to understand the method of acquisition, and specifically in the context of reformatted CT scans to review the original axial images of any area of suspicion.

## 4. Conclusion

We present an artefactual type 2 odontoid fracture caused by movement of the patient in conjunction with reformatted images. The importance of recognising this phenomenon is emphasised.

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